

9 Apr 84

CHAPTER 1

GENERAL CONSIDERATIONS

1-1. Purpose and scope. This manual covers new storage depots for Army mobilization facilities. Guidance is given for the design and layout of railroads, roadways, storage yards, and warehouse site planning. The manual does not cover the requirements for storage of coal or ammunition or for building design and construction.

1-2. Depot function. The function of an Army storage depot is to acquire, accumulate, identify, prepare for storage, store under satisfactory conditions, process, prepare for shipment, distribute, and regulate the flow of supplies, equipment, and goods necessary for the efficient support of the using Army agency under mobilization constraints.

1-3. Depot types. Storage depots are used for storage in conjunction with the supply of Army agencies within the conterminous United States and for supplying installations in other countries. In-transit depots are primarily used for the temporary storage of supplies, equipment, and material intended for export to other countries.

1-4. Location. In general, the location of the depot will have been previously determined.

a. Storage depots. When a site has not been previously determined and in order to facilitate construction and reduce costs, site planning should work with the level areas and the natural drainage characteristics. It should be near major truck routes and close to at least one rail line. The site may also have access to an airport. The depot site should be centrally located with respect to all the Army agencies that will use it as a means of supply.

b. In-transit depots. In-transit depots may be located at or near the port of export to facilitate use of storage-in-transit freight rules. The site should provide for both covered and open storage, protection, accessibility to and from road and rail lines, means of access to ship berths, and security measures. Much of the export and retrograde materials will be containerized; therefore, provisions need to be made for storage and marshaling areas to accommodate containers moving through the in-transit depot.

1-5. Overall requirements.

a. Minimum criteria. The designer will be furnished the requirements for the facilities based on the following factors:

9 Apr 84

(1) Gross area requirements for:

- warehouse storage
- shed storage
- open storage
- administrative areas (if separate)
- support facilities

(2) Gross area and special requirements for:

- flammable material storage
- hazardous chemical storage
- radioactive material storage

(3) Volume flow requirements for:

- average and maximum volumes received
- average and maximum volumes shipped

(4) Personnel and equipment numbers for:

- officer personnel and equipment
- material handling equipment
- support equipment

b. Storage area definitions. Gross storage area requirements refer to the entire square foot area of the storage warehouse, shed, or open storage area. Gross space for storage operations is gross storage area less unusable space, standby space, and space not allocated to DOD use (rented space). Net storage areas refer to areas on which material may be stored. Net storage space is gross space for storage operations less aisle space, space lost to structural obstructions, and administrative space (work space and offices).

1-6. General arrangements. Depot layouts will be designed for both rail and truck service. The following principles should apply to general layouts.

a. Warehouse layouts. Warehouses will be laid out in rows of buildings with tracks and roads alternating between building rows such that each warehouse is served by both truck and freight car loading and unloading accesses. The lengths of rows should be governed by efficiency of road and track operation and the amount of necessary interwarehouse movement. Single-story warehouses should be planned for rather than multistory units. Space between individual warehouses will be sufficient to establish minimum fire protection and adequate access to other parts of the depot.

9 Apr 84

b. Shed layouts. Shed storage should be adjacent to warehouse storage and laid out in longitudinal rows similar to warehouses. They may be open on the sides and ends or closed on the sides and open on the ends, but always fully covered to protect the goods from the elements. Each shed should have concrete slabs surrounding the shed area such that wheeled vehicles such as forklift trucks can supply the sheds without difficulty.

c. Open storage. Open storage areas are preferably located adjacent to and parallel with both warehouse and shed areas. These areas will be designed for supply and distribution by both rail and truck vehicles. Storage areas in open storage will be designed to accommodate oversized material, material that can weather the elements, and containerized cargo. Since much of Army cargo will be shipped and stored in containers, open storage areas should be designed for their convenience.

d. Material handling equipment.

(1) General. Material handling equipment (MHE) is any piece of equipment or machinery designed to facilitate the lifting, moving, and stacking of material in any of the areas of the storage mission.

(2) Cranes and hoists. Large and heavy storage items require specialized storage areas and heavy lift equipment to move them. In particular at Army storage depots, such material as jeeps, aircraft wings, helicopter blades, trucks, lumber, and steel are some of the large, bulky, heavy materials that cannot be economically lifted by forklift trucks or similar equipment. Most of the above mentioned material and the great majority of other bulky items require outside storage and are most easily moved by cranes or hoists.

(a) Yard gantry cranes. Rubber-tired gantry cranes can move about on paved surfaces and have a limited turning radius. They are very flexible and due to their height off the ground, they are well adapted to placing loadings at great boom distance beyond highly stacked material close to the crane.

(b) Truck-mounted cranes. The truck-mounted crane is slightly more versatile than the gantry cranes in its mobility around the depot; however, it cannot handle as high-capacity loads as the gantry cranes, and it is more limited in reach when maneuvering near stacking material. Truck-mounted cranes come in capacities from 5 tons up to 300 tons.

(c) Locomotive cranes. These cranes are mounted on rail cars and operate from trackage on the depot. They are well suited to loading and unloading of open rail cars containing material of moderate weight. They are restricted to moving material close to the track on which they are riding.

9 Apr 84

(d) Crawler-mounted cranes. Crawler-mounted cranes are similar to truck-mounted cranes, but their crawler treads spread the weight more evenly over the surface and they can track over weaker soil areas. They have about the same handling capacities as the truck-mounted cranes.

(e) Straddle carrier hoists. For moving lumber, or steel, or elongated items that are stored outside and stored in long rows spaced closely together, a straddle carrier hoist is an efficient means of accessing the material. This type of hoist generally travels on rubber tires and runs in narrow aisles between the piles of materials. These vehicles can also be used to unload open rail cars where the track is embedded in a wearing surface that allows the hoist to maneuver across them.

(f) Overhead hoists. For indoor storage of large, bulky items, the use of overhead hoists provides the mobility that is necessary without taking up expensive storage space for material handling access. The columns flanking a hoist-served bay need to be designed for the additional loads imposed by the hoist. Additionally, widths of the bay between columns will be restricted by the physical dimensions of the hoist.

1-7. Access requirements.

a. Truck access. The size of access roads to supply the depot facility will depend upon the size of the facility and the daily volume flow of truck vehicles. One two-lane access road branching from the main highway will fill requirements for small to moderate facilities. Additional lanes or provisions for multiple access roads to handle large volumes of traffic may be necessary for large facilities. Heavy loads, such as heavy-lift cranes, will in most cases require an improved road surface. For example, the gantry crane and the straddle carrier hoists cannot operate on unimproved soil when it becomes wet. If the hauler-mounted crane is used in place of the gantry crane or the straddle carrier hoists, the track should be flat so that the crane does not damage the pavement. Details of road construction requirements may be found in EM 1110-3-130, EM 1110-3-131, and EM 1110-3-132.

b. Traffic flow. Ideally, access roads should be designed to funnel truck traffic into a reporting yard from which it could be directed to its ultimate destination. Traffic would flow easily along loop-type roads where a vehicle could approach its assigned berth from one direction, load or unload its cargo, and continue away from the storage area around a loop or out of the storage facility on a different access road to avoid congestion of vehicles reversing direction. In the warehouse platform areas a sufficient paved area should be provided along the platforms to maneuver truck traffic for

9 Apr 84

loading or unloading the trailer from either the tail or side. Truck access should be provided to sheds and open storage areas.

c. Rail traffic. The depot should be located as near as possible to main line railroads to avoid having to lay long access track to the facility. The ends of tracks that are used for rail-mounted cranes should be fitted with stops, unless the crane is traveling on a main line track within the depot. Tracks that are placed within storage areas should be recessed into the pavement so that wheeled vehicles such as forklift trucks can operate within the area without having to negotiate the elevated track. Crossovers for locomotive cranes, which generally travel on standard gage track, should be provided every 2,000 feet to allow for easy access to all parts of the storage area.

d. In-transit depots. Requirements for access to in-transit depots should be similar to those for storage depots; however, major emphasis should be placed on truck and container vehicle access.

1-8. Staging of construction. Due to the shortened time, material, and manpower constraints, construction may have to be staged. Initially all construction should be kept as austere as possible. The use of expedient surfaces such as landing mats are appropriate at the early stages of the logistics support operation. The type of mat employed must be capable of withstanding sustained container handling operations over a several-month period without a major maintenance effort. After demand for engineer troop units becomes less critical and sources of aggregate and construction material become available, the mat can be replaced with either flexible or rigid pavement.